

# 74HC574; 74HCT574

Octal D-type flip-flop; positive edge-trigger; 3-state

Rev. 7 — 4 March 2016

Product data sheet

## 1. General description

The 74HC574; 74HCT574 is an 8-bit positive-edge triggered D-type flip-flop with 3-state outputs. The device features a clock (CP) and output enable ( $\overline{OE}$ ) inputs. The flip-flops will store the state of their individual D-inputs that meet the set-up and hold time requirements on the LOW-to-HIGH clock (CP) transition. A HIGH on  $\overline{OE}$  causes the outputs to assume a high-impedance OFF-state. Operation of the  $\overline{OE}$  input does not affect the state of the flip-flops. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ .

## 2. Features and benefits

- Input levels:
  - ◆ For 74HC574: CMOS level
  - ◆ For 74HCT574: TTL level
- 3-state non-inverting outputs for bus oriented applications
- 8-bit positive, edge-triggered register
- Common 3-state output enable input
- Complies with JEDEC standard no. 7 A
- Multiple package options
- ESD protection:
  - ◆ HBM JESD22-A114F exceeds 2 000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$

## 3. Ordering information

Table 1. Ordering information

| Type number | Package                                                         |         |                                                                           |          |
|-------------|-----------------------------------------------------------------|---------|---------------------------------------------------------------------------|----------|
|             | Temperature range                                               | Name    | Description                                                               | Version  |
| 74HC574D    | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | SO20    | plastic small outline package; 20 leads;<br>body width 7.5 mm             | SOT163-1 |
| 74HCT574D   |                                                                 |         |                                                                           |          |
| 74HC574DB   | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | SSOP20  | plastic shrink small outline package; 20 leads;<br>body width 5.3 mm      | SOT339-1 |
| 74HCT574DB  |                                                                 |         |                                                                           |          |
| 74HC574PW   | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | TSSOP20 | plastic thin shrink small outline package; 20 leads;<br>body width 4.4 mm | SOT360-1 |
| 74HCT574PW  |                                                                 |         |                                                                           |          |

4. Functional diagram

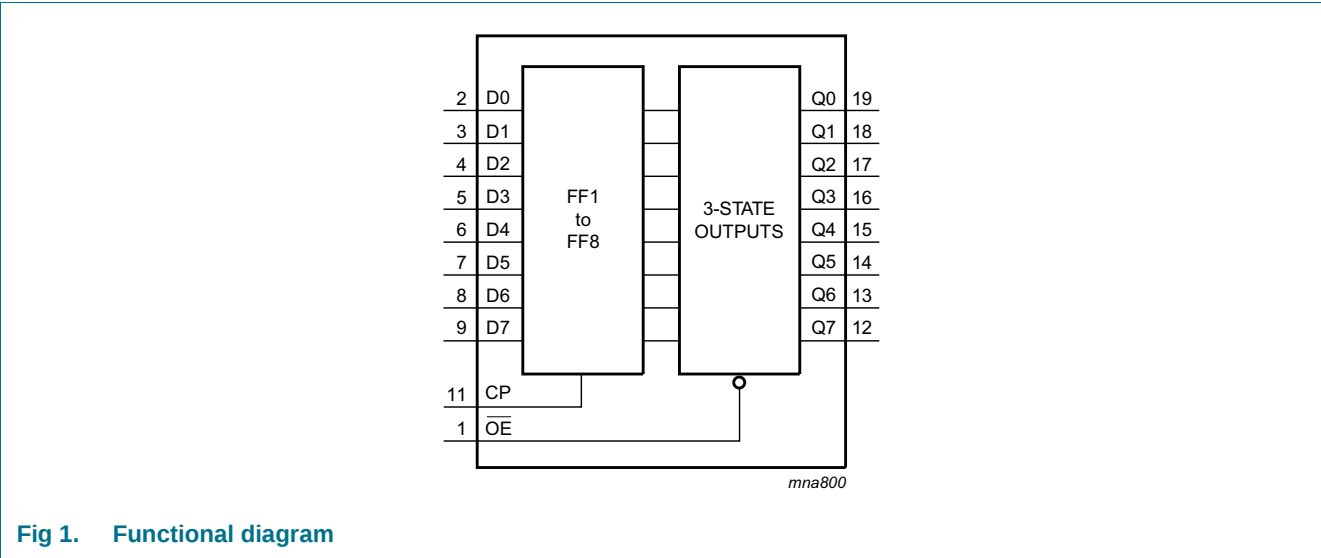


Fig 1. Functional diagram

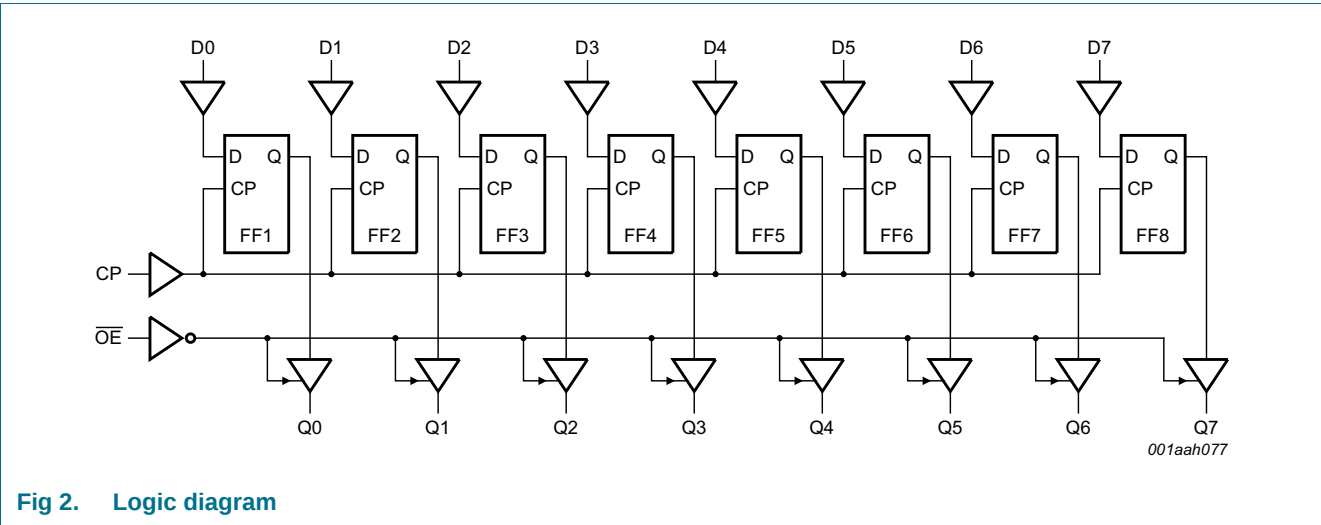


Fig 2. Logic diagram

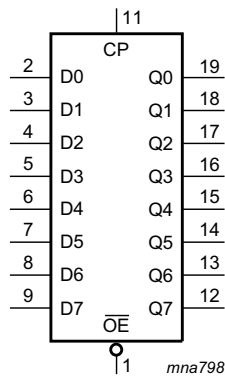


Fig 3. Logic symbol

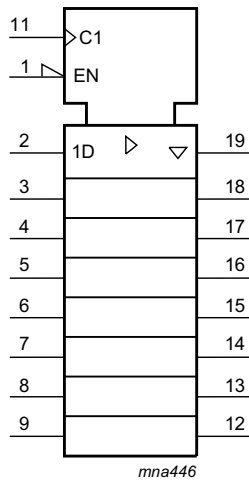


Fig 4. IEC logic symbol

5. Pinning information

5.1 Pinning

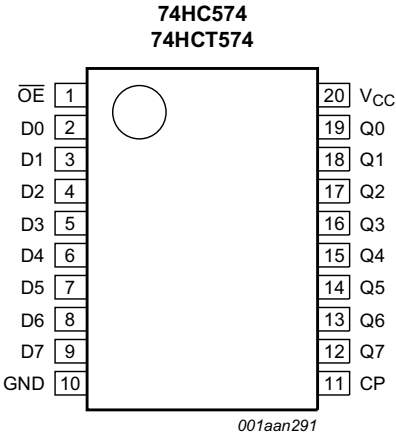


Fig 5. Pin configuration SO20, SSOP20 and TSSOP20

5.2 Pin description

Table 2. Pin description

| Symbol          | Pin                            | Description                               |
|-----------------|--------------------------------|-------------------------------------------|
| $\overline{OE}$ | 1                              | 3-state output enable input (active LOW)  |
| D[0:7]          | 2, 3, 4, 5, 6, 7, 8, 9         | data input                                |
| GND             | 10                             | ground (0 V)                              |
| CP              | 11                             | clock input (LOW-to-HIGH, edge triggered) |
| Q[0:7]          | 19, 18, 17, 16, 15, 14, 13, 12 | 3-state flip-flop output                  |
| V <sub>CC</sub> | 20                             | supply voltage                            |

## 6. Functional description

Table 3. Function table<sup>[1]</sup>

| Operating mode                   | Input |    |    | Internal flip-flop | Output Qn |
|----------------------------------|-------|----|----|--------------------|-----------|
|                                  | OE    | CP | Dn |                    |           |
| Load and read register           | L     | ↑  | l  | L                  | L         |
|                                  | L     | ↑  | h  | H                  | H         |
| Load register and disable output | H     | ↑  | l  | L                  | Z         |
|                                  | H     | ↑  | h  | H                  | Z         |

- [1] H = HIGH voltage level;  
 h = HIGH voltage level one setup time prior to the HIGH-to-LOW CP transition;  
 L = LOW voltage level;  
 l = LOW voltage level one setup time prior to the HIGH-to-LOW CP transition;  
 Z = high-impedance OFF-state;  
 ↑ = LOW-to-HIGH clock transition.

## 7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

| Symbol    | Parameter               | Conditions                                             | Min  | Max  | Unit |
|-----------|-------------------------|--------------------------------------------------------|------|------|------|
| $V_{CC}$  | supply voltage          |                                                        | -0.5 | +7   | V    |
| $I_{IK}$  | input clamping current  | $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$ | -    | ±20  | mA   |
| $I_{OK}$  | output clamping current | $V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$ | -    | ±20  | mA   |
| $I_O$     | output current          | $V_O = -0.5\text{ V}$ to $(V_{CC} + 0.5\text{ V})$     | -    | ±35  | mA   |
| $I_{CC}$  | supply current          |                                                        | -    | +70  | mA   |
| $I_{GND}$ | ground current          |                                                        | -    | -70  | mA   |
| $T_{stg}$ | storage temperature     |                                                        | -65  | +150 | °C   |
| $P_{tot}$ | total power dissipation | SO20, SSOP20 and TSSOP20 packages <sup>[1]</sup>       | -    | 500  | mW   |

- [1] For SO20:  $P_{tot}$  derates linearly with 8 mW/K above 70 °C.  
 For SSOP20 and TSSOP20 packages:  $P_{tot}$  derates linearly with 5.5 mW/K above 60 °C.

## 8. Recommended operating conditions

Table 5. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V)

| Symbol    | Parameter           | Conditions | 74HC574 |     |          | 74HCT574 |     |          | Unit |
|-----------|---------------------|------------|---------|-----|----------|----------|-----|----------|------|
|           |                     |            | Min     | Typ | Max      | Min      | Typ | Max      |      |
| $V_{CC}$  | supply voltage      |            | 2.0     | 5.0 | 6.0      | 4.5      | 5.0 | 5.5      | V    |
| $V_I$     | input voltage       |            | 0       | -   | $V_{CC}$ | 0        | -   | $V_{CC}$ | V    |
| $V_O$     | output voltage      |            | 0       | -   | $V_{CC}$ | 0        | -   | $V_{CC}$ | V    |
| $T_{amb}$ | ambient temperature |            | -40     | +25 | +125     | -40      | +25 | +125     | °C   |

**Table 5. Recommended operating conditions ...continued**  
 Voltages are referenced to GND (ground = 0 V) ...continued

| Symbol              | Parameter                           | Conditions               | 74HC574 |      |     | 74HCT574 |      |     | Unit |
|---------------------|-------------------------------------|--------------------------|---------|------|-----|----------|------|-----|------|
|                     |                                     |                          | Min     | Typ  | Max | Min      | Typ  | Max |      |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 2.0 \text{ V}$ | -       | -    | 625 | -        | -    | -   | ns/V |
|                     |                                     | $V_{CC} = 4.5 \text{ V}$ | -       | 1.67 | 139 | -        | 1.67 | 139 | ns/V |
|                     |                                     | $V_{CC} = 6.0 \text{ V}$ | -       | -    | 83  | -        | -    | -   | ns/V |

## 9. Static characteristics

**Table 6. Static characteristics**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol          | Parameter                 | Conditions                                                                                                             | 25 °C |      |      | −40 °C to +85 °C |      | −40 °C to +125 °C |       | Unit |
|-----------------|---------------------------|------------------------------------------------------------------------------------------------------------------------|-------|------|------|------------------|------|-------------------|-------|------|
|                 |                           |                                                                                                                        | Min   | Typ  | Max  | Min              | Max  | Min               | Max   |      |
| 74HC574         |                           |                                                                                                                        |       |      |      |                  |      |                   |       |      |
| V <sub>IH</sub> | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V                                                                                                | 1.5   | 1.2  | -    | 1.5              | -    | 1.5               | -     | V    |
|                 |                           | V <sub>CC</sub> = 4.5 V                                                                                                | 3.15  | 2.4  | -    | 3.15             | -    | 3.15              | -     | V    |
|                 |                           | V <sub>CC</sub> = 6.0 V                                                                                                | 4.2   | 3.2  | -    | 4.2              | -    | 4.2               | -     | V    |
| V <sub>IL</sub> | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V                                                                                                | -     | 0.8  | 0.5  | -                | 0.5  | -                 | 0.5   | V    |
|                 |                           | V <sub>CC</sub> = 4.5 V                                                                                                | -     | 2.1  | 1.35 | -                | 1.35 | -                 | 1.35  | V    |
|                 |                           | V <sub>CC</sub> = 6.0 V                                                                                                | -     | 2.8  | 1.8  | -                | 1.8  | -                 | 1.8   | V    |
| V <sub>OH</sub> | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                                                    |       |      |      |                  |      |                   |       |      |
|                 |                           | I <sub>O</sub> = −20 μA; V <sub>CC</sub> = 2.0 V                                                                       | 1.9   | 2.0  | -    | 1.9              | -    | 1.9               | -     | V    |
|                 |                           | I <sub>O</sub> = −20 μA; V <sub>CC</sub> = 4.5 V                                                                       | 4.4   | 4.5  | -    | 4.4              | -    | 4.4               | -     | V    |
|                 |                           | I <sub>O</sub> = −20 μA; V <sub>CC</sub> = 6.0 V                                                                       | 5.9   | 6.0  | -    | 5.9              | -    | 5.9               | -     | V    |
|                 |                           | I <sub>O</sub> = −6.0 mA; V <sub>CC</sub> = 4.5 V                                                                      | 3.98  | 4.32 | -    | 3.84             | -    | 3.7               | -     | V    |
|                 |                           | I <sub>O</sub> = −7.8 mA; V <sub>CC</sub> = 6.0 V                                                                      | 5.48  | 5.81 | -    | 5.34             | -    | 5.2               | -     | V    |
| V <sub>OL</sub> | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                                                    |       |      |      |                  |      |                   |       |      |
|                 |                           | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 2.0 V                                                                        | -     | 0    | 0.1  | -                | 0.1  | -                 | 0.1   | V    |
|                 |                           | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 4.5 V                                                                        | -     | 0    | 0.1  | -                | 0.1  | -                 | 0.1   | V    |
|                 |                           | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 6.0 V                                                                        | -     | 0    | 0.1  | -                | 0.1  | -                 | 0.1   | V    |
|                 |                           | I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V                                                                       | -     | 0.15 | 0.26 | -                | 0.33 | -                 | 0.4   | V    |
|                 |                           | I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V                                                                       | -     | 0.16 | 0.26 | -                | 0.33 | -                 | 0.4   | V    |
| I <sub>I</sub>  | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V                                                       | -     | -    | ±0.1 | -                | ±1.0 | -                 | ±1.0  | μA   |
| I <sub>OZ</sub> | OFF-state output current  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 6.0 V; V <sub>O</sub> = V <sub>CC</sub> or GND | -     | -    | ±0.5 | -                | ±5.0 | -                 | ±10.0 | μA   |
| I <sub>CC</sub> | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 6.0 V                                 | -     | -    | 8.0  | -                | 80   | -                 | 160   | μA   |
| C <sub>I</sub>  | input capacitance         |                                                                                                                        | -     | 3.5  | -    | -                | -    | -                 | -     | pF   |

**Table 6.** Static characteristics ...continued

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol           | Parameter                 | Conditions                                                                                                                               | 25 °C |      |      | –40 °C to +85 °C |      | –40 °C to +125 °C |      | Unit |
|------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-------|------|------|------------------|------|-------------------|------|------|
|                  |                           |                                                                                                                                          | Min   | Typ  | Max  | Min              | Max  | Min               | Max  |      |
| 74HCT574         |                           |                                                                                                                                          |       |      |      |                  |      |                   |      |      |
| V <sub>IH</sub>  | HIGH-level input voltage  | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                         | 2.0   | 1.6  | -    | 2.0              | -    | 2.0               | -    | V    |
| V <sub>IL</sub>  | LOW-level input voltage   | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                         | -     | 1.2  | 0.8  | -                | 0.8  | -                 | 0.8  | V    |
| V <sub>OH</sub>  | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V                                                            |       |      |      |                  |      |                   |      |      |
|                  |                           | I <sub>O</sub> = –20 μA                                                                                                                  | 4.4   | 4.5  | -    | 4.4              | -    | 4.4               | -    | V    |
|                  |                           | I <sub>O</sub> = –6 mA                                                                                                                   | 3.98  | 4.32 | -    | 3.84             | -    | 3.7               | -    | V    |
| V <sub>OL</sub>  | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V                                                            |       |      |      |                  |      |                   |      |      |
|                  |                           | I <sub>O</sub> = 20 μA                                                                                                                   | -     | 0    | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                  |                           | I <sub>O</sub> = 6.0 mA                                                                                                                  | -     | 0.16 | 0.26 | -                | 0.33 | -                 | 0.4  | V    |
| I <sub>I</sub>   | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V                                                                         | -     | -    | ±0.1 | -                | ±1.0 | -                 | ±1.0 | μA   |
| I <sub>OZ</sub>  | OFF-state output current  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 5.5 V; V <sub>O</sub> = V <sub>CC</sub> or GND                   | -     | -    | ±0.5 | -                | ±5.0 | -                 | ±10  | μA   |
| I <sub>CC</sub>  | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V                                                   | -     | -    | 8.0  | -                | 80   | -                 | 160  | μA   |
| ΔI <sub>CC</sub> | additional supply current | V <sub>I</sub> = V <sub>CC</sub> – 2.1 V; other inputs at V <sub>CC</sub> or GND; V <sub>CC</sub> = 4.5 V to 5.5 V; I <sub>O</sub> = 0 A |       |      |      |                  |      |                   |      |      |
|                  |                           | per input pin; Dn inputs                                                                                                                 | -     | 50   | 180  | -                | 225  | -                 | 245  | μA   |
|                  |                           | per input pin; $\overline{\text{OE}}$ input                                                                                              | -     | 125  | 450  | -                | 563  | -                 | 613  | μA   |
|                  |                           | per input pin; CP input                                                                                                                  | -     | 150  | 540  | -                | 675  | -                 | 735  | μA   |
| C <sub>I</sub>   | input capacitance         |                                                                                                                                          | -     | 3.5  | -    | -                | -    | -                 | -    | pF   |

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; for test circuit see [Figure 9](#).

| Symbol           | Parameter         | Conditions                                                         | 25 °C |     |     | –40 °C to +85 °C |     | –40 °C to +125 °C |     | Unit |
|------------------|-------------------|--------------------------------------------------------------------|-------|-----|-----|------------------|-----|-------------------|-----|------|
|                  |                   |                                                                    | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| 74HC574          |                   |                                                                    |       |     |     |                  |     |                   |     |      |
| t <sub>pd</sub>  | propagation delay | CP to Qn; see <a href="#">Figure 6</a> <sup>[1]</sup>              |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                                            | -     | 47  | 150 | -                | 190 | -                 | 225 | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                                            | -     | 17  | 30  | -                | 35  | -                 | 45  | ns   |
|                  |                   | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF                      | -     | 14  | -   | -                | -   | -                 | -   | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                                            | -     | 14  | 26  | -                | 33  | -                 | 38  | ns   |
| t <sub>en</sub>  | enable time       | $\overline{OE}$ to Qn; see <a href="#">Figure 8</a> <sup>[2]</sup> |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                                            | -     | 44  | 140 | -                | 175 | -                 | 210 | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                                            | -     | 16  | 28  | -                | 35  | -                 | 42  | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                                            | -     | 13  | 24  | -                | 30  | -                 | 36  | ns   |
| t <sub>dis</sub> | disable time      | $\overline{OE}$ to Qn; see <a href="#">Figure 8</a> <sup>[3]</sup> |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                                            | -     | 39  | 125 | -                | 155 | -                 | 190 | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                                            | -     | 14  | 25  | -                | 31  | -                 | 38  | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                                            | -     | 11  | 21  | -                | 26  | -                 | 32  | ns   |
| t <sub>t</sub>   | transition time   | Qn; see <a href="#">Figure 6</a> <sup>[4]</sup>                    |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                                            | -     | 14  | 60  | -                | 75  | -                 | 90  | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                                            | -     | 5   | 12  | -                | 15  | -                 | 18  | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                                            | -     | 4   | 10  | -                | 13  | -                 | 15  | ns   |
| t <sub>w</sub>   | pulse width       | CP HIGH or LOW; see <a href="#">Figure 7</a>                       |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                                            | 80    | 14  | -   | 100              | -   | 120               | -   | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                                            | 16    | 5   | -   | 20               | -   | 24                | -   | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                                            | 14    | 4   | -   | 17               | -   | 20                | -   | ns   |
| t <sub>su</sub>  | set-up time       | Dn to CP; see <a href="#">Figure 7</a>                             |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                                            | 60    | 6   | -   | 75               | -   | 90                | -   | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                                            | 12    | 2   | -   | 15               | -   | 18                | -   | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                                            | 10    | 2   | -   | 13               | -   | 15                | -   | ns   |
| t <sub>h</sub>   | hold time         | Dn to CP; see <a href="#">Figure 7</a>                             |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                                            | 5     | 0   | -   | 5                | -   | 5                 | -   | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                                            | 5     | 0   | -   | 5                | -   | 5                 | -   | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                                            | 5     | 0   | -   | 5                | -   | 5                 | -   | ns   |
| f <sub>max</sub> | maximum frequency | CP; see <a href="#">Figure 6</a>                                   |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                                            | 6.0   | 37  | -   | 4.8              | -   | 4.0               | -   | MHz  |
|                  |                   | V <sub>CC</sub> = 4.5 V                                            | 30    | 112 | -   | 24               | -   | 20                | -   | MHz  |
|                  |                   | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF                      | -     | 123 | -   | -                | -   | -                 | -   | MHz  |
|                  |                   | V <sub>CC</sub> = 6.0 V                                            | 35    | 133 | -   | 28               | -   | 24                | -   | MHz  |

**Table 7. Dynamic characteristics ...continued**

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; for test circuit see [Figure 9](#).

| Symbol          | Parameter                     | Conditions                                                               | 25 °C |     |     | –40 °C to +85 °C |     | –40 °C to +125 °C |     | Unit |
|-----------------|-------------------------------|--------------------------------------------------------------------------|-------|-----|-----|------------------|-----|-------------------|-----|------|
|                 |                               |                                                                          | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| $C_{PD}$        | power dissipation capacitance | $C_L = 50$ pF; $f = 1$ MHz;<br>$V_I = \text{GND to } V_{CC}$ [5]         | -     | 22  | -   | -                | -   | -                 | -   | pF   |
| <b>74HCT574</b> |                               |                                                                          |       |     |     |                  |     |                   |     |      |
| $t_{pd}$        | propagation delay             | CP to Qn; see <a href="#">Figure 6</a> [1]                               |       |     |     |                  |     |                   |     |      |
|                 |                               | $V_{CC} = 4.5$ V                                                         | -     | 18  | 33  | -                | 41  | -                 | 50  | ns   |
|                 |                               | $V_{CC} = 5$ V; $C_L = 15$ pF                                            | -     | 15  | -   | -                | -   | -                 | -   | ns   |
| $t_{en}$        | enable time                   | OE to Qn; see <a href="#">Figure 8</a> [2]                               |       |     |     |                  |     |                   |     |      |
|                 |                               | $V_{CC} = 4.5$ V                                                         | -     | 19  | 33  | -                | 41  | -                 | 50  | ns   |
| $t_{dis}$       | disable time                  | OE to Qn; see <a href="#">Figure 8</a> [3]                               |       |     |     |                  |     |                   |     |      |
|                 |                               | $V_{CC} = 4.5$ V                                                         | -     | 16  | 28  | -                | 35  | -                 | 42  | ns   |
| $t_t$           | transition time               | Qn; see <a href="#">Figure 6</a> [4]                                     |       |     |     |                  |     |                   |     |      |
|                 |                               | $V_{CC} = 4.5$ V                                                         | -     | 5   | 12  | -                | 15  | -                 | 18  | ns   |
| $t_W$           | pulse width                   | CP HIGH or LOW;<br>see <a href="#">Figure 7</a>                          |       |     |     |                  |     |                   |     |      |
|                 |                               | $V_{CC} = 4.5$ V                                                         | 16    | 7   | -   | 20               | -   | 24                | -   | ns   |
| $t_{su}$        | set-up time                   | Dn to CP; see <a href="#">Figure 7</a>                                   |       |     |     |                  |     |                   |     |      |
|                 |                               | $V_{CC} = 4.5$ V                                                         | 12    | 3   | -   | 15               | -   | 18                | -   | ns   |
| $t_h$           | hold time                     | Dn to CP; see <a href="#">Figure 7</a>                                   |       |     |     |                  |     |                   |     |      |
|                 |                               | $V_{CC} = 4.5$ V                                                         | 5     | –1  | -   | 5                | -   | 5                 | -   | ns   |
| $f_{max}$       | maximum frequency             | CP; see <a href="#">Figure 6</a>                                         |       |     |     |                  |     |                   |     |      |
|                 |                               | $V_{CC} = 4.5$ V                                                         | 30    | 69  | -   | 24               | -   | 20                | -   | MHz  |
|                 |                               | $V_{CC} = 5$ V; $C_L = 15$ pF                                            | -     | 76  | -   | -                | -   | -                 | -   | MHz  |
| $C_{PD}$        | power dissipation capacitance | $C_L = 50$ pF; $f = 1$ MHz;<br>$V_I = \text{GND to } V_{CC} - 1.5$ V [5] | -     | 25  | -   | -                | -   | -                 | -   | pF   |

[1]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .

[2]  $t_{en}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .

[3]  $t_{dis}$  is the same as  $t_{PLZ}$  and  $t_{PHZ}$ .

[4]  $t_t$  is the same as  $t_{THL}$  and  $t_{TLH}$ .

[5]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).

$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$  where:

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

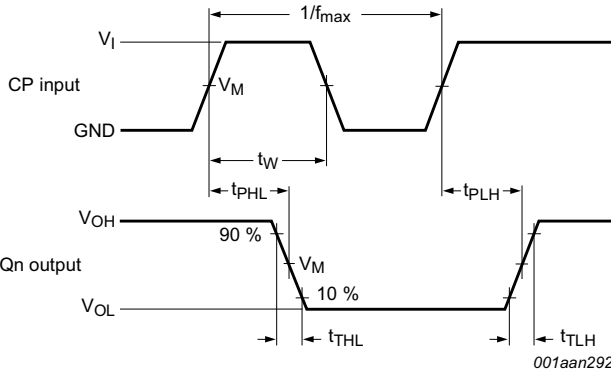
$C_L$  = output load capacitance in pF;

$V_{CC}$  = supply voltage in V;

$N$  = number of inputs switching;

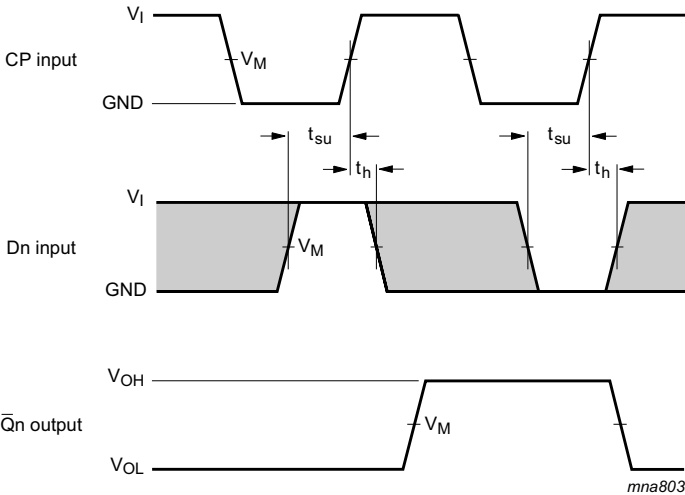
$\Sigma(C_L \times V_{CC}^2 \times f_o)$  = sum of outputs.

11. Waveforms



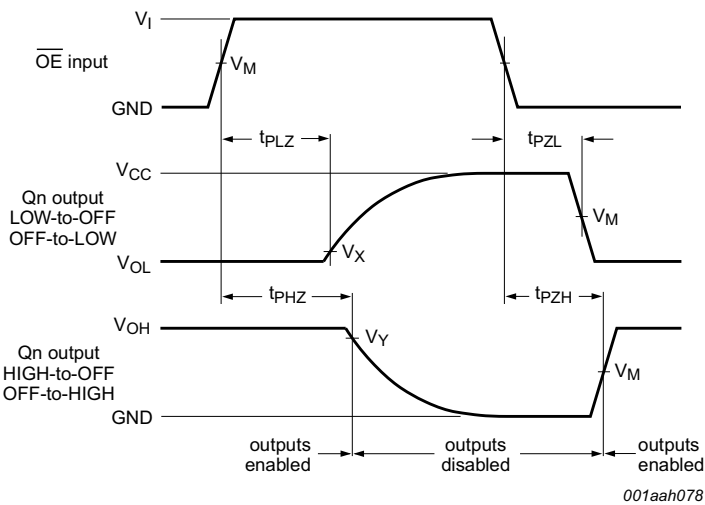
Measurement points are given in [Table 8](#).  
 $V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

**Fig 6.** Propagation delay input (CP) to output (Qn), output transition time, clock input (CP) pulse width and the maximum frequency (CP)



Measurement points are given in [Table 8](#).  
 $V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

**Fig 7.** The data input (D) to clock input (CP) set-up times and clock input (CP) to data input (D) hold times



Measurement points are given in [Table 8](#).  
 $V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

**Fig 8. Enable and disable times**

**Table 8. Measurement points**

| Type     | Input       | Output      |             |             |
|----------|-------------|-------------|-------------|-------------|
|          | $V_M$       | $V_M$       | $V_X$       | $V_Y$       |
| 74HC574  | $0.5V_{CC}$ | $0.5V_{CC}$ | $0.1V_{CC}$ | $0.9V_{CC}$ |
| 74HCT574 | 1.3 V       | 1.3 V       | $0.1V_{CC}$ | $0.9V_{CC}$ |

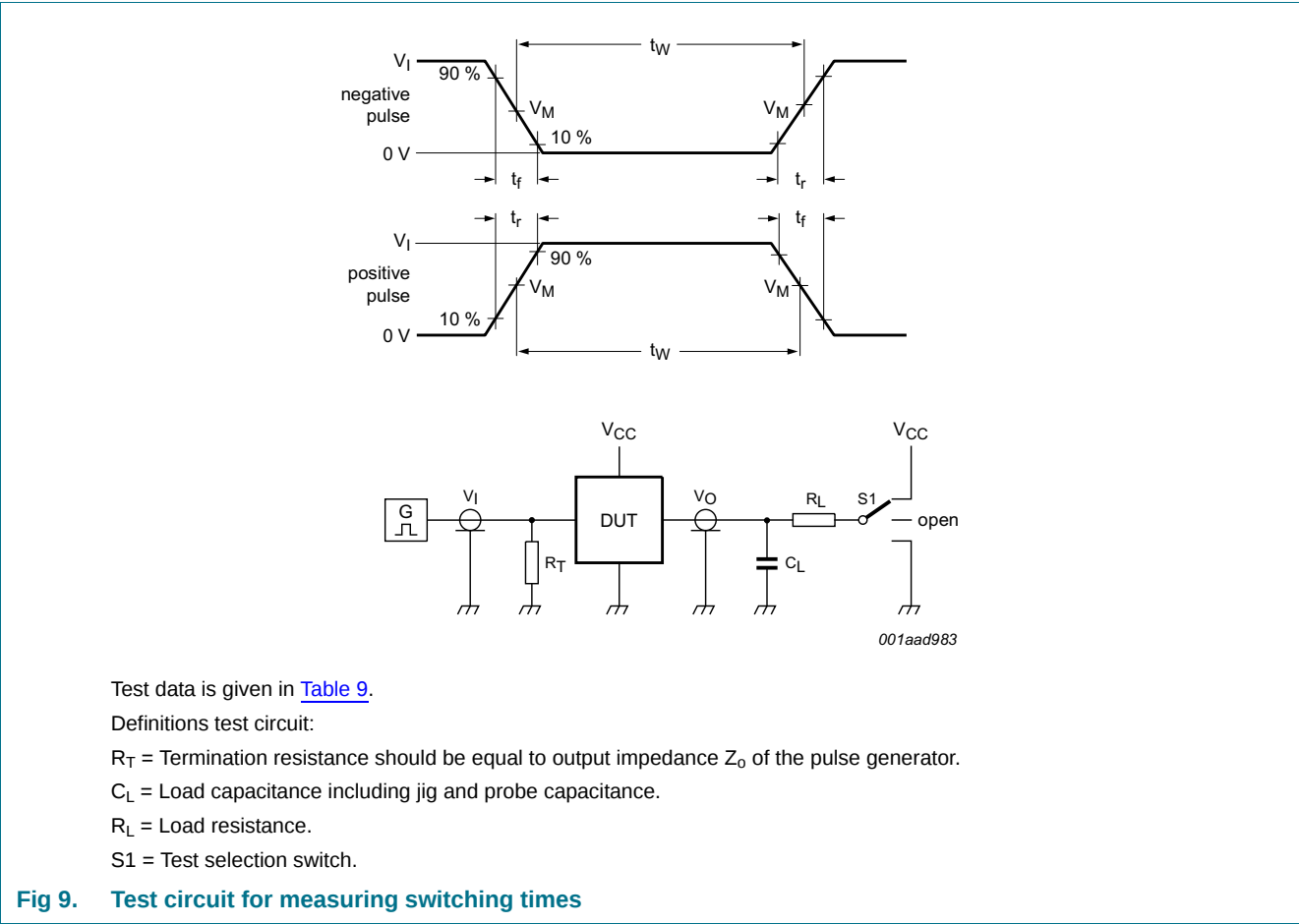


Table 9. Test data

| Type     | Input    |            | Load         |              | S1 position        |                    |                    |
|----------|----------|------------|--------------|--------------|--------------------|--------------------|--------------------|
|          | $V_I$    | $t_r, t_f$ | $C_L$        | $R_L$        | $t_{PHL}, t_{PLH}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ |
| 74HC574  | $V_{CC}$ | 6 ns       | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |
| 74HCT574 | 3 V      | 6 ns       | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |

12. Package outline

SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1

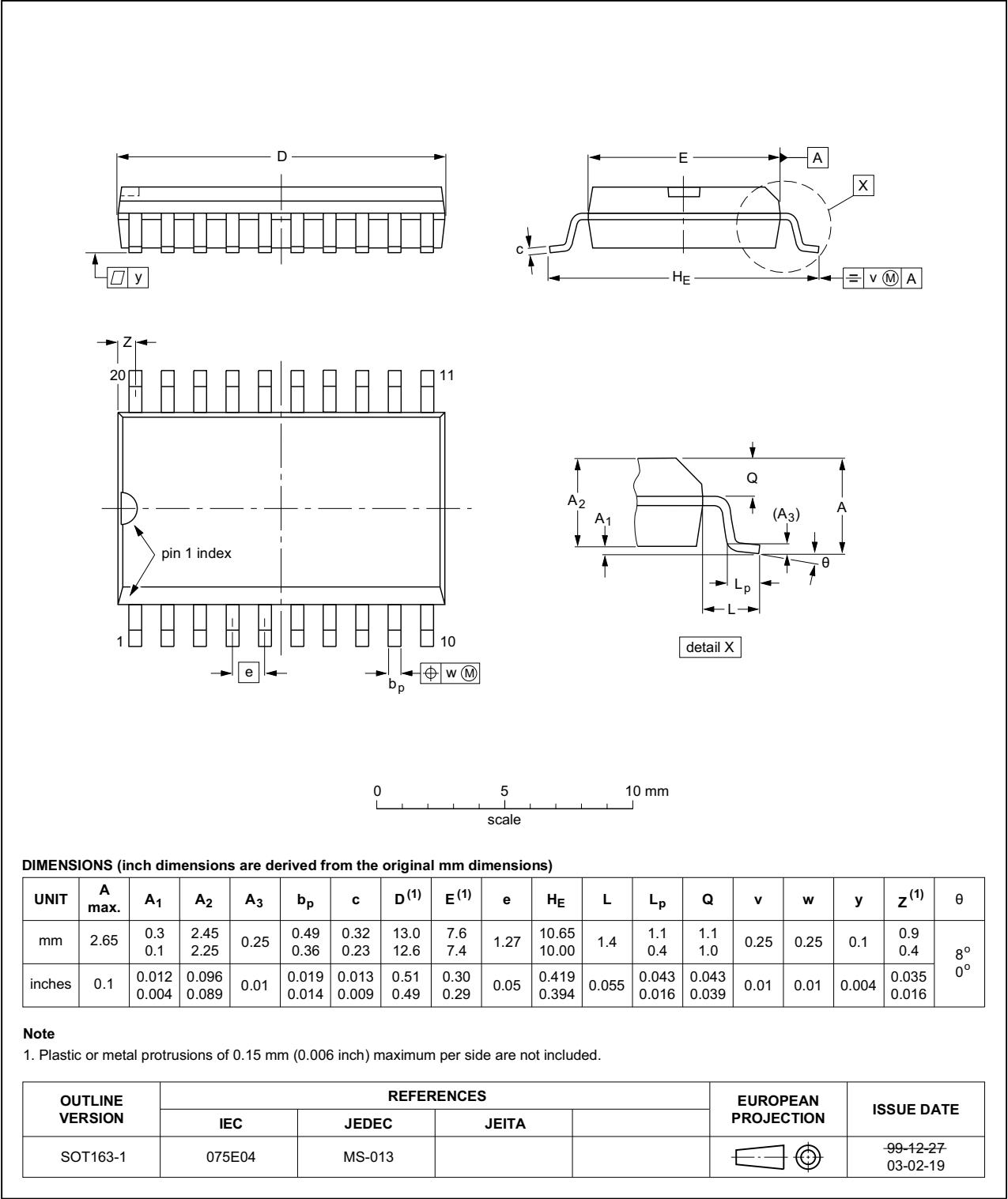
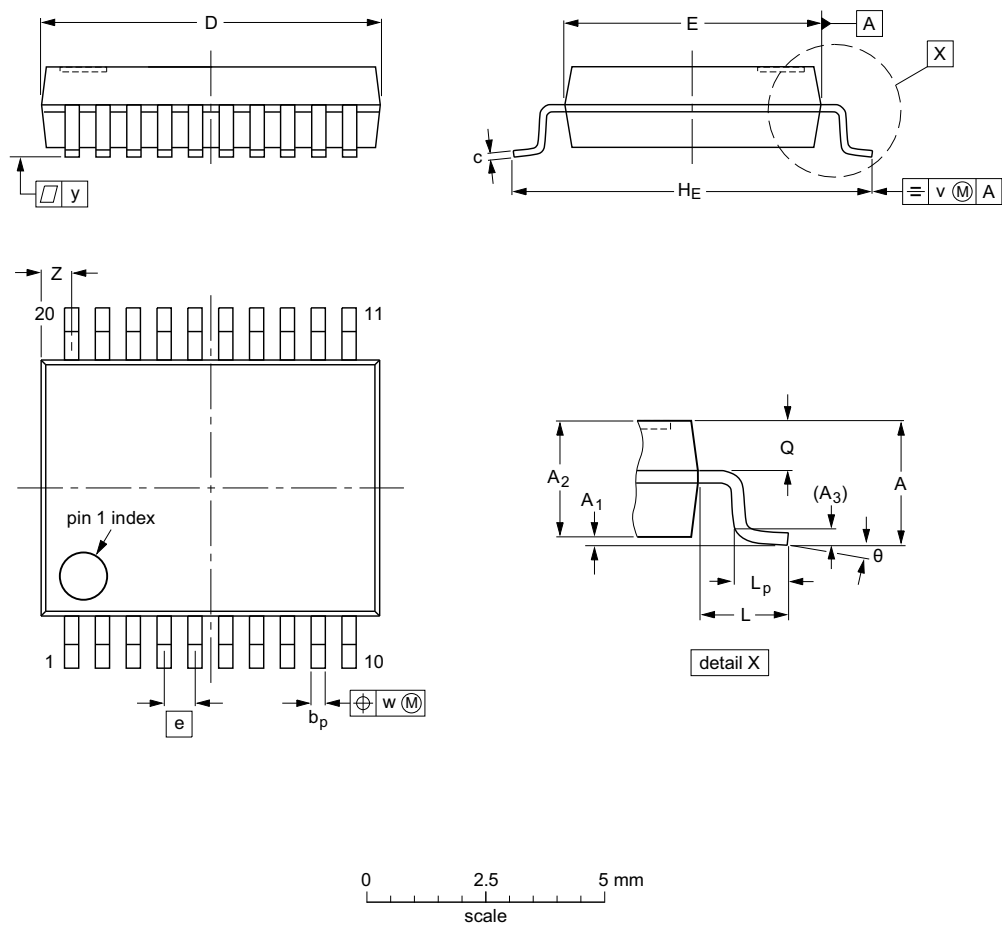


Fig 10. Package outline SOT163-1 (SO20)

SSOP20: plastic shrink small outline package; 20 leads; body width 5.3 mm

SOT339-1



DIMENSIONS (mm are the original dimensions)

| UNIT | A<br>max. | A <sub>1</sub> | A <sub>2</sub> | A <sub>3</sub> | b <sub>p</sub> | c            | D <sup>(1)</sup> | E <sup>(1)</sup> | e    | H <sub>E</sub> | L    | L <sub>p</sub> | Q          | v   | w    | y   | Z <sup>(1)</sup> | θ        |
|------|-----------|----------------|----------------|----------------|----------------|--------------|------------------|------------------|------|----------------|------|----------------|------------|-----|------|-----|------------------|----------|
| mm   | 2         | 0.21<br>0.05   | 1.80<br>1.65   | 0.25           | 0.38<br>0.25   | 0.20<br>0.09 | 7.4<br>7.0       | 5.4<br>5.2       | 0.65 | 7.9<br>7.6     | 1.25 | 1.03<br>0.63   | 0.9<br>0.7 | 0.2 | 0.13 | 0.1 | 0.9<br>0.5       | 8°<br>0° |

Note

1. Plastic or metal protrusions of 0.2 mm maximum per side are not included.

| OUTLINE<br>VERSION | REFERENCES |        |       |  | EUROPEAN<br>PROJECTION | ISSUE DATE            |
|--------------------|------------|--------|-------|--|------------------------|-----------------------|
|                    | IEC        | JEDEC  | JEITA |  |                        |                       |
| SOT339-1           |            | MO-150 |       |  |                        | 99-12-27-<br>03-02-19 |

Fig 11. Package outline SOT339-1 (SSOP20)

TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm

SOT360-1

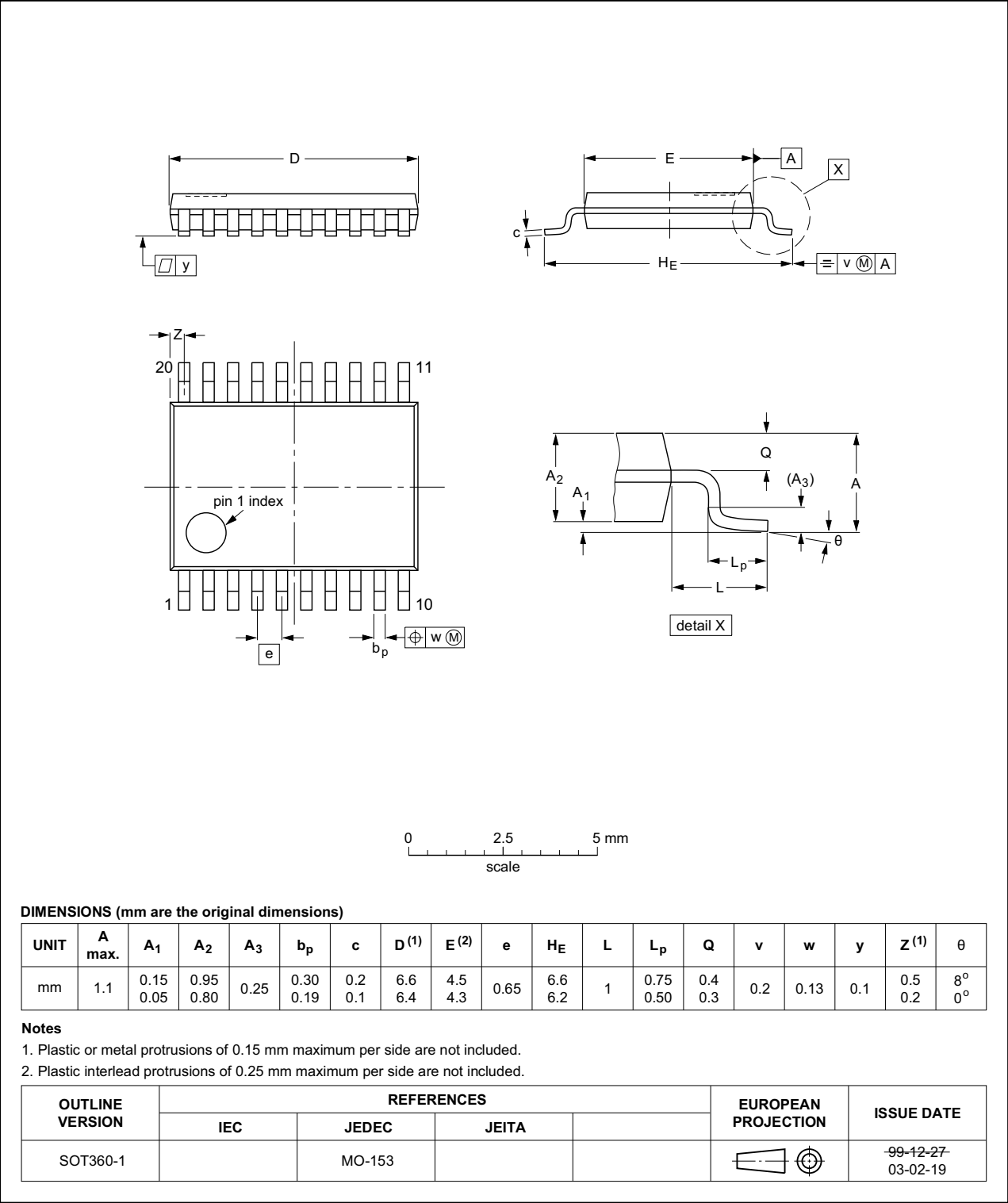


Fig 12. Package outline SOT360-1 (TSSOP20)

## 13. Abbreviations

Table 10. Abbreviations

| Acronym | Description                             |
|---------|-----------------------------------------|
| CMOS    | Complementary Metal Oxide Semiconductor |
| DUT     | Device Under Test                       |
| ESD     | ElectroStatic Discharge                 |
| HBM     | Human Body Model                        |
| MM      | Machine Model                           |
| TTL     | Transistor-Transistor Logic             |

## 14. Revision history

Table 11. Revision history

| Document ID         | Release date                                                                                   | Data sheet status     | Change notice | Supersedes          |
|---------------------|------------------------------------------------------------------------------------------------|-----------------------|---------------|---------------------|
| 74HC_HCT574 v.7     | 20160304                                                                                       | Product data sheet    | -             | 74HC_HCT574 v.6     |
| Modifications:      | • Type numbers 74HC574N and 74HCT574N (SOT146-1) removed.                                      |                       |               |                     |
| 74HC_HCT574 v.6     | 20150126                                                                                       | Product data sheet    | -             | 74HC_HCT574 v.5     |
| Modifications:      | • <a href="#">Table 7</a> : Power dissipation capacitance condition for 74HCT574 is corrected. |                       |               |                     |
| 74HC_HCT574 v.5     | 20120425                                                                                       | Product data sheet    | -             | 74HC_HCT574 v.4     |
| Modifications:      | • $V_X$ and $V_Y$ measurement points added to Table 8.                                         |                       |               |                     |
| 74HC_HCT574 v.4     | 20111219                                                                                       | Product data sheet    | -             | 74HC_HCT574 v.3     |
| Modifications:      | • Legal pages updated.                                                                         |                       |               |                     |
| 74HC_HCT574 v.3     | 20101215                                                                                       | Product data sheet    | -             | 74HC_HCT574_CNV v.2 |
| 74HC_HCT574_CNV v.2 | 19970827                                                                                       | Product specification | -             | -                   |

## 15. Legal information

### 15.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | Definition                                                                            |
|-----------------------------------|-------------------------------|---------------------------------------------------------------------------------------|
| Objective [short] data sheet      | Development                   | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet    | Qualification                 | This document contains data from the preliminary specification.                       |
| Product [short] data sheet        | Production                    | This document contains the product specification.                                     |

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nexperia.com>.

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